Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Service Rules for the 5.850-5.925 GHz Band, and Revisions to Part 90 of the Commission's Rules	)	WT Docket No. 01-90

STATUS REPORT ON LICENSING AND SERVICE ISSUES AND DEPLOYMENT STRATEGIES FOR DSRC-BASED INTELLIGENT TRANSPORTATION SERVICES IN THE 5.850-5.925 GHz Band

Of Counsel:
Robert B. Kelly
Benigno E. Bartolome
Squire, Sanders & Dempsey, LLP
1201 Pennsylvania Ave., N.W.
Post Office Box 407
Washington, D.C. 20044-0407
(202) 626-6600

John J. Collins
CEO & President
Intelligent Transportation Society of America
400 Virginia Ave., S.W.
Suite 800
Washington, D.C. 20024-2730
(202) 484-4847

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SUMMARY

In October 1999, the Federal Communications Commission released its *Report & Order*, FCC 99-305, in ET Docket 98-95, allocating the 5850-5925 MHz Band for use by Dedicated Short Range Communications Systems ("DSRC") to provide intelligent transportation services. The Commission deferred to a later proceeding the development of service and licensing rules for the DSRC allocation.

Over the past year, the Intelligent Transportation Society of America ("ITS America") has led significant consensus building activities on the optimal service and licensing rules among public and private sector ITS stakeholders. These activities have been primarily directed at fostering national interoperability in the deployment of DSRC-based ITS user services -- a national goal established by Congress in the Transportation Equity Act for the 21st Century ("TEA-21"). To this end, ITS America has hosted stakeholder workshops, panels and other industry meetings. The American Society for Testing and Materials ("ASTM"), through its Working Group E17.51, has held numerous meetings looking toward setting standards for DSRC equipment operating in the 5.9 GHz band. Public and private sector participation in these activities has been robust and the dialogue and debate constructive. Indeed, several viable and competing technological approaches have been presented in these sessions and are currently under consideration.

ITS America is pleased to report to the Commission today that substantial progress has been made since October 1999 toward building a consensus among ITS stakeholders on the optimal service and licensing rules. Among the issues considered by the industry are the balancing of public safety DSRC requirements with private and commercial uses, the accommodation of competing technical approaches, and the optimal licensing approach to attain

a critical mass in industry deployment. There is clear consensus among the stakeholders that the DSRC-based ITS services that provide safety-related information (*e.g.*, in-vehicle warnings) should be regarded as public safety services by the FCC and licensed as such. Accordingly, under any scenario, a significant block of the DSRC spectrum should be set aside for licensing to public safety eligibles. This will also likely require frequency coordination by the public safety coordinators. ITS America believes that accommodation of the public safety uses of DSRC services must be accorded the highest priority in the FCC's service and licensing rules.

The options under active consideration as a consensus approach to band channelization of the DSRC spectrum have been narrowed to three possibilities. These are (in no order of preference): (a) allocation of the DSRC spectrum for public safety usage; (b) division of the DSRC spectrum between public safety and private/commercial uses licensed on a site specific basis; and (c) division of the DSRC spectrum between public safety and commercial usage licensed by geographic area. Each of these approaches has advantages and disadvantages that are currently under evaluation by the stakeholders.

In particular, allocation of the entire 75 MHz to public safety DSRC uses would ensure that the critical public safety applications that are the core of the DSRC-based ITS user services may be provided as robustly as possible. This approach, however, may leave emerging private and commercial DSRC uses unserved. Moreover, since the availability of sufficient public funding to support the entire build out of DSRC infrastructure needed to obtain virtual ubiquity is uncertain, the private and commercial markets indeed may be essential to attaining economies of scale and to meeting the TEA-21 mandate.

Division of the DSRC spectrum between public safety and private uses to be licensed on a site specific basis would require careful balancing of the respective needs of both segments

with priority accorded public safety uses. However, it is unclear whether site specific licensing of private uses would present an attractive alternative to commercial entities that desire to establish a DSRC-based business. This issue requires further exploration and consensus building.

Division of the DSRC spectrum between public safety and commercial uses licensed by geographic area may present the most certain commercial environment for the capital markets. However, ITS stakeholders are concerned that this approach may also pose the greatest danger that the spectrum would be diverted by the geographic licensees to non-ITS purposes. This concern may be addressed to some degree by the imposition of use and eligibility restrictions on any commercial DSRC spectrum.

Currently, a number of ITS stakeholders are encouraging the U.S. Department of Transportation ("U.S. DOT") to explore the costs and benefits of mandating that DSRC devices, offering a new communications capability, be installed in all new vehicles. At the present time, however, there are differences of opinion among ITS stakeholders on the benefits of such a mandate and further dialogue and consensus building are required on this issue.

Both narrowband and wideband channelization solutions have been proposed by ITS stakeholders. Both of these technical approaches appear feasible, capable of serving ITS applications and supported by significant capital formation. While there are technical risks associated with either solution, ITS stakeholders have some concern at present that the wideband approaches may more easily lend themselves to non-ITS uses. Accordingly, it appears that a band channelization plan must also be accompanied by usage limitations with non-ITS uses permitted only on an ancillary basis.

ITS America requests that the FCC seek comments on the issues addressed in this Status Report. As the FCC is well aware, consensus on licensing and service issues requires a careful balancing of competing interests and can be time consuming. ITS America is committed to continuing its consensus building on these issues, which are of critical importance to the ITS community and the traveling public. ITS America will continue to keep the Commission apprised of the status of these efforts in anticipation of a Notice of Proposed Rulemaking promulgating service rules for the DSRC spectrum allocation.

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I. INTRODUCTION

A. FCC Proceedings in ET Docket No. 98-95

1. The *Report & Order*

On October 22, 1999, the Commission issued a *Report & Order* allocating 75 megahertz of spectrum in the 5.850-5.925 GHz band to the mobile service for use by Dedicated Short Range Communications ("DSRC")[1] systems operating in the Intelligent Transportation System ("ITS") radio service.[2] The *Report and Order* was issued in response to ITS America's Petition for Rulemaking requesting spectrum allocation in the 5.850-5.925 GHz band for DSRC-based ITS services. This allocation was needed in order to improve highway safety and efficiency as part of the U.S. Department of Transportation's Intelligent Transportation Systems national program. The Commission stated: the "record in [the] proceeding overwhelmingly supports the allocation of spectrum for DSRC-based ITS applications to increase traveler safety, reduce fuel consumption and pollution, and continue to advance the nation's economy."[3] The Commission also recognized the need for the allocation, given the substantial efforts by both government and

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1 The Commission adopted ITS America's proposed definition of DSRC services (set out in Section 90.7 of its Rules):

> The use of non-voice radio techniques to transfer data over short distances between roadside and mobile radio units, between mobile units, and between portable and mobile units to perform operations related to the improvement of traffic flow, traffic safety and other intelligent transportation service applications, in a variety of public and commercial environments. DSRC systems may also transmit status and instructional messages related to the units involved.

2 *See In the Matter of Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, RM-9096, 14 FCC Rcd 18221 (rel. Oct. 22, 1999) ("*Report & Order*").

3 *Id.* at 18223.

non-government entities to develop, in response to Congress's transportation legislation – *i.e.*, ISTEA[4] and TEA-21[5], a National ITS Plan and Architecture addressing ways of using communications technologies to increase the efficiency of the nation's transportation infrastructure.

The Commission found that the allocation of spectrum in the 5.9 GHz region is the "best available choice" for DSRC applications.[6] The Commission indicated that the 5.850-5.925 GHz band was appropriate for DSRC-based ITS applications due to the variety of operations to be accommodated, the propagation characteristics of the band, the significant efforts of the Federal and state governments paired with industry to research ITS use in this band, and ITS developments internationally. Accordingly, the Commission allocated the 5.850-5.925 GHz band on a primary basis to the mobile service for use by DSRC-based ITS operations.

In its Petition for Rulemaking, ITS America did not propose a specific channelization plan, licensing method or technical rules, stating that these issues require development of consensus through standardization activities and the Commission deliberations in the proceeding. The Commission generally agreed, but decided to adopt basic technical requirements

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4 The Intermodal Surface Transportation Efficiency Act of 1991 ("ISTEA"), Pub. L. No. 102-240, 105 Stat. 1914 (1991), established a national program within the U.S. Department of Transportation to develop "Intelligent Transportation Systems" within the United States.

5 Congress reaffirmed in TEA-21 (Transportation Equity Act for the 21st Century, Pub. L. No. 105-178, 112 Stat. 107 (1998)) the national priority of a timely deployment of ITS services and called for a robust deployment of those services over the next six years.

6 *Report & Order*, 14 FCC Rcd at 18224.

(*i.e.*, on power,[7] emission limits,[8] and RF safety guidelines[9]) in order to promote spectrum sharing and create a basic framework for the development of DSRC operational standards by industry. The Commission also recognized that the technical rules it adopted "may need to be reviewed at such time as [it] develops licensing and service rules for DSRC systems."[10]

On the issue of licensing, the Commission found that low power unlicensed DSRC could benefit some applications, such as fee collection at parking garages and commercial establishments. The Commission also stated that it would explore further the possibility of establishing unlicensed or licensed-by-rule requirements for the 5.850-5.925 GHz band once DSRC standards are developed and it has a better idea of what technical requirements would be necessary.[11]

On a channelization plan, the Commission found that a spectrum channelization plan would facilitate the efficient use of the spectrum and interoperability among various DSRC services, but found the record in the proceeding, at that time, to be insufficient to devise a

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7 *See* 47 C.F.R. § 90.205(m).

8 The Commission adopted the emission mask requirements of Section 90.210(k) for DSRC operations in the 5.9 GHz band. *See Report & Order*, 14 FCC Rcd at 18233. The Commission also stated: "We recognize that depending on the developing DSRC applications, the licensing scheme adopted and the corresponding spectrum channelization plan, we may need to revisit the emission limits between specific channels or applications, *e.g.*, more sensitive applications on specific channels may require additional protection or a licensee with access to multiple consecutive channels in a geographic area could benefit from additional flexibility regarding unwanted emissions without affecting other operations." *Id.*

9 The Commission required that DSRC operations comply with the RF safety guidelines contained in the Second Memorandum Opinion and Order in ET Docket No. 93-62, 12 FCC Rcd 13494 (1997). *See Report & Order*, 14 FCC Rcd at 18234.

10 *Id.* at 18230.

11 *Id.* at 18235-36.

specific channel plan that would adequately address the spectrum requirements, both narrowband and broadband, of the various potential DSRC applications.[12] The Commission thus invited the ITS industry and the U.S. DOT to consider the spectrum requirements of various DSRC applications and recommend a spectrum channel plan. The Commission indicated that it would address this matter further in a future proceeding proposing licensing and service rules.[13]

2. Pending Petitions for Reconsideration

Mark IV Industries, Ltd. and Panamsat Corporation separately filed petitions seeking reconsideration or clarification of certain issues addressed in the *Report & Order*. ITS America submitted comments in response to these petitions, noting that these issues could simply be addressed in the context of the proceeding to develop service rules and that the issues raised did not require reconsideration of the *Report & Order*.[14]

B. ITS America

ITS America is a nonprofit, educational association dedicated to the development and deployment of intelligent transportation systems to improve the safety and efficiency of the nation's transportation infrastructure, and to promote the use of technology in transportation to save lives, time, and money and to improve the quality of life.

Since its inception in 1991, ITS America has provided a leadership role in the public/private partnership to deploy ITS. In this capacity, ITS America serves as a Utilized

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12 *Id.* at 18231.

13 *Id.*

14 *See* Comments of ITS America (in response to Mark IV's and Panamsat's petitions) in ET Docket No. 98-95 (filed March 2, 2000)

Federal Advisory Committee to the U.S. DOT under the Federal Advisory Committee Act.[15] In addition, ITS America coordinates and represents its members in ITS matters, including participating in proceedings and rulemakings before the FCC to help realize the implementation of policies to promote the deployment of ITS user services throughout the United States consistent with the mandates of ISTEA and TEA-21. ITS America is also a member of the Land Mobile Communications Council ("LMCC").

ITS America's members are drawn from all facets of business, the academic community and government that have a stake in the application of technology to transportation. Over 350 of ITS America's members are corporations involved in the provision of transportation goods and services. Collectively, these members are representative of the entire transportation industry in the United States and a significant percentage of the worldwide transportation industry. Another approximately 135 members represent federal, state and municipal transportation agencies with responsibility for the deployment, oversight and management of the nation's transportation infrastructure. In addition, approximately 50 research institutions and universities contribute their insights and innovations in the field of surface transportation as members of ITS America.

1. ITS America has Sponsored Industry Standards and Consensus Activities Regarding Spectrum Use.

Since October 1999, ITS America has convened a number of stakeholder meetings and user groups to define further user requirements that are incorporated in the standards development process. In the initial petition, filed on May 19, 1997, the following applications were submitted, as examples of DSRC:

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15 5 U.S.C. Appendix.

A. Existing DSRC-based Services currently operating in the 902-928 MHz band

1. Electronic Payment Services
   a. Electronic Toll Collection
   b. Electronic Parking Payments

2. Commercial Vehicle Electronic Clearance

B. Emerging DSRC-based Service

1. Traffic Management/Control
   a. Transit Vehicle Signal Priority
   b. Emergency Vehicle Signal Preemption

2. Incident Management

3. En-route Driver Information
   a. In-vehicle signing
   b. Driver Advisory

4. Automated Roadside Safety Inspection

5. Public Transportation Management

6. Freight Mobility
   a. Automatic Equipment Monitoring
   b. Fleet Management

7. Highway-Rail Intersection

C. Future DSRC-based Services

1. Intersection Collision Warning System

2. Automated Highway System (Vehicle-to-Vehicle Communications)

3. Other Uses (Drive-thru payments, rental car processing, Smart Card Applications, etc.)

Since the initial petition was filed, the number of applications has also increased, reflecting rapid developments in the wireless industry, new technology alternatives and open standards already available. Certainly, all of these applications fall within the Commission's definition of DSRC. These applications may be presented in several broad functional categories:

- ACCESS POINT OPERATIONS
  - Access control (In/Out Tracking)

- TRAFFIC MANAGEMENT
  - Probe Data Collection
  - Traffic Information
  - In-vehicle signing
  - Work Zone Warning
  - Highway/Rail Intersection Warning
  - Road Condition Warning

- TRAFFIC SIGNAL INTERFACE
  - Intersection Collision Avoidance
  - Emergency Vehicle Signal Preemption
  - Transit Vehicle Signal Priority

- ELECTRONIC PAYMENT (In-motion)
  - Toll Collection
  - Parking Payment
  - Rental Car Processing

- ELECTRONIC PAYMENT (Stationary)
  - Gas (Fuel) Payment
  - Fast Food Payment
  - Pharmacy Drive-Thru Payment

- MAINTENANCE
  - Diagnostic Data
  - Repair-Service Record
  - Vehicle Computer Program Updates
  - Map and Music Data Updates

- COMMERCIAL VEHICLE OPERATIONS (In-motion)
  - Rollover Warning
  - Mainline Screening (Weigh-Station Clearance)
  - Border Clearance
  - On-Board Safety Data Transfer
  - Unique CVO Fleet Management

- COMMERCIAL VEHICLE OPERATIONS (Stationary)
  - Driver's Daily Log
  - Vehicle Safety Inspection
  - Truck Tractor-Trailer Interface

- TRANSIT DATA TRANSFER
  - Transit Vehicle Data Transfer
  - Transit Vehicle Refueling

- RAIL DATA TRANSFER
  - Locomotive Fuel Monitoring

- Locomotive Data Transfer

- OTHER DATA TRANSFER
  - Vehicle Registration Tag (formerly Electronic License Plate)

a. December 1999 Workshop (*see* Appendix A)

On December 16-17, 1999, ITS America held a 5.9 GHz Stakeholders Workshop for ITS Applications in order to confirm the user requirements, receive various vendors' input and formulate the necessary next steps.

While this Workshop re-confirmed the public and private sector commitment to deploy DSRC services at 5.9 GHz, it also revealed that a proven technology and an open, interoperable standard would not be adequate without a comprehensive deployment strategy. Since the licensing rules, deployment strategies, technology, open standards, products and applications are all inter-related, the ITS industry is faced with a "chicken and egg" conundrum.

The preliminary results of the Stakeholder Workshop are shown below:

5.9 GHZ is dedicated to ITS applications

A primary attraction of the 5.9 GHz band for ITS applications is that it has been specifically set aside for these ITS uses. Other bands, especially where licensing is not required (*e.g.*, 902-928 MHz), are vulnerable to crowding and interference. Lack of contention is especially important for safety-critical activities where reliability and speed are crucial. In addition, liability risks may be lower using of a band (like 5.9 GHz) where users have co-primary status and must be licensed.

DSRC aimed at applications needing high-reliability, real-time communications with moving vehicle. Without DSRC, some safety applications may not get deployed

Dedicated Short-Range Communication (DSRC) is particularly appropriate for applications whose requirements include high-reliability real-time data communications with a rapidly moving vehicle. High-reliability in this context includes the high likelihood of channel availability when needed. Commercial two-way radio, satellite communications, and cellular telephony do not meet the need for both high-reliability and real-time service and, in some cases, do not provide needed coverage. Applications include: toll collection (more generally road pricing), transparent commercial vehicle border crossing, traffic signal preemption by emergency and transit vehicles (green wave), in-vehicle warning systems for highway-rail intersections and highway work zones, etc. In the absence of a well-established DSRC base, some of these safety applications could be difficult or impractical to implement.

DSRC could be suitable for other applications as well, given a sizable installed based of DSRC

There are a variety of other applications, whose vehicle-infrastructure ("V/I") communications requirements are less demanding than those above. DSRC will work for these applications, too, but so will other V/I communications technologies. These applications include a variety of fee payment applications (at quick service restaurant drive-throughs, parking lots, pay-at-the-pump gas stations, etc.) DSRC would probably not be the technology of first choice for these applications, but if vehicles were already equipped for DSRC, then using DSRC would potentially be more attractive than adding another RF device in the vehicle. Some applications have broader bandwidth or higher data throughput requirements than are currently envisioned for DSRC. These include multimedia applications (*e.g.*, downloading a movie to a backseat entertainment system) and internet connection. Some, but probably not all, of these applications could be handled by an enhanced version of DSRC.

Only a clear market can justify the large technology investment needed for DSRC at 5.9GHz

Making DSRC available in the 5.9 GHz band will require a very large technology investment by prospective vendors. The vendors are reluctant to make such an investment unless there is a clear market for the resulting products. The case for such an investment depends on (a) the selection of DSRC at 5.9 GHz for a variety of applications beyond toll collection and CVO crossings, or (b) the decision to incorporate DSRC/5.9 transponders as standard equipment in new vehicles.

In turn, the market for DSRC depends, among other things, on the deployment of public and private infrastructure that will make use of DSRC at 5.9 GHz for fee collection, information delivery, etc.

Other communication technologies are almost ready for deployment

However, other technologies for V/I communications are coming rapidly to market which can meet the requirements of applications that do not involve communicating with vehicles traveling at high speed. If DSRC at 5.9 GHz is not ready for deployment very soon, then these less demanding applications will be implemented using alternative V/I communications technologies, drastically curtailing the available market for DSRC at 5.9 GHz. Application developers state that plans and prototypes for DSRC solutions will have to be available in 2000 if they are to be considered as technology candidates.

U.S. DOT might mandate DSRC, but process is slow; but industry could anticipate the mandate

Under certain circumstances (discussed below), U.S. DOT might move toward mandating DSRC devices in new vehicles. Such rulemaking would require two or more years to complete. However, it is not unreasonable to conclude that if U.S. DOT were moving steadily toward mandatory DSRC, automotive manufacturers might begin to incorporate DSRC devices into their new vehicles in advance of a regulatory requirement to do so.

Prospect of mandate could increase DSRC appeal

Similarly, if there was a clear, early movement toward incorporating DSRC technology in all new vehicles, the developers of applications requiring V/I communications would potentially look more favorably on DSRC as the V/I communications technology alternative.

Prerequisites for U.S. DOT DSRC mandate include clear public interest and well-accepted standard. Opposition is likely in any case.

For U.S. DOT to consider mandating DSRC, there are (at minimum) two prerequisites.

One is a clear public interest in the widespread deployment of DSRC. For example, an argument can be made that electronic toll collection and transparent CVO border crossings would help to relieve congestion, reduce fuel consumption, mitigate emissions, and improve safety. Similarly, DSRC-based in-vehicle warning systems could improve safety at highway-rail intersections, work sites, and other hazardous locations. The safety benefits of these applications will potentially not be realized without broadly installed DSRC technology.

The second prerequisite is the existence of a well-accepted industry standard, consensus or de facto, for DSRC at 5.9 GHz.

Even if these prerequisites are met, it is likely that other technical interests, with alternative approaches to V/I communications, would oppose such rule making.

DSRC standards needed rapidly; consortium has been proposed

Industry proponents of DSRC at 5.9 GHz are therefore under a significant onus to move forward at high speed toward a DSRC standard at 5.9 GHz. DSRC vendor representatives have proposed the formation of a vendor consortium to rapidly develop the relevant standard specifications and to promote the use of DSRC to the developers and deployers of applications using V/I communications, notably including vehicle manufacturers.

Recommend that Consortium move ahead

Recommendation to DSRC technology vendors: To form a consortium to work toward the rapid development and delivery of a standard 5.9 GHz DSRC specification by late spring 2000, preferably one which encourages an open development environment that will help to enable to the broadest possible set of applications.

Recommend that U.S. DOT encourage work of Consortium

Recommendation to U.S. DOT: To support the work of such a consortium to prepare a suitable standard specification by late spring 2000, to the extent of:

- Providing the services of an FCC Consultant (on such issues as band use, channelization)
- Providing the services of a data security consultant (encryption requirements)
- Providing the services of a standards editorial contractor (all layers)
- Supporting common needs testing related to DSRC at 5.9 GHz:
  + Environmental – ice, snow, slush, sand, dirt, dust
  + Performance evaluation[16] – 802.11 protocol, modulation (BPSK, QPSK, other)
  + Validate existing IEEE 1455 Layer 7 standard for use at 5.9 GHz
  + Validate new standards for Layers 1 and 2

Recommend that U.S. DOT initiate public comment on DSRC mandate

Recommendation to U.S. DOT: To initiate public comment, potentially leading to rulemaking on the inclusion in all new vehicles of an industry-standard DSRC transponder at 5.9 GHz. Such a process would be terminated without action if such a standard specification were not in place by mid-2000. It is suggested that U.S. DOT develop, for inclusion in the request for public comment, a draft set of criteria by which to evaluate the appropriateness of V/I communications alternatives, including DSRC at 5.9 GHz. It is suggested that these criteria focus first on the public interest related applications (*e.g.*, safety), but also pay attention to applications of more general interest that will help to drive the market, including e-commerce and broadband applications.

Recommend that U.S. DOT encourage infrastructure deployment

Recommendation to U.S. DOT: At such point that a rule to mandate the inclusion of transponders appears likely, to initiate the formulation of policies and incentives to encourage state and local authorities and private sector ISPs to deploy infrastructure and develop national application standards for the deployment of interoperable toll, CVO, and warning system applications using in-vehicle DSRC at 5.9 GHz.

b. DSRC Standards Writing Group Meetings

Since June 1999, a standards writing group has been meeting monthly under the auspices of ASTM to develop new user requirements for DSRC at 5.9 GHz and to draft open and

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[16] Since the December Workshop, Motorola's FreeSpace technology using FSK, discussions on the MAC Layer, and interference characteristics have also been added.

interoperable standards. A substantial number of applications and user requirements input have been received from several Public Safety organizations, from the Public Transit community, railroad, and vehicular applications for vehicle-to-vehicle communications and interface with the ITS Data Bus (the "IDB").

Other requirements have been submitted by a number of vendors who advocate the use of DSRC, through its integration with the IDB, as an in-vehicle modem providing a new communications capability to the vehicle with high data rate, wideband capability. This technology is analogous to an outdoor application of wireless Local Area Network (LAN) with a roadside access for vehicular (mobile) applications.

The next three meetings of the standards writing group are scheduled for October 25-26, November 13-14, and December 5-7, 2000. Three distinct technologies with varying bandwidth requirements and technical parameters are currently under consideration by the standards writing group. By the end of 2000, the writing group plans to complete a flexible channelization plan that accommodates, to the extent possible, these technologies.

c. ITS America 10th Annual Meeting – Boston, MA

Further meetings, including a meeting of the standards writing working group, were held on May 3, 2000, during the ITS America 10th Annual Meeting in Boston. This meeting also included representatives from Industry Canada to focus on North American coordination issues.

The result of this meeting reflected the critical nature of the issues, and prompted ITS America to establish a Task Force under the direct supervision of the its Board of Directors to oversee all of the activities, both FCC-related and deployment focused.

A workshop for the members of the Board of Directors was held on August 7-9, 2000. The workshop focused on the integral relationship and the ramification between the FCC's

service rules and the deployment strategies for DSRC, as well as the business plans of the vendors, manufacturers, service and application providers, and infrastructure deployers.

2. ITS America has Provided U.S. DOT Formal Advice as a Utilized Federal Advisory Committee on DSRC Implementation (*see* Appendix B).

On June 5, 2000, the ITS America Board of Directors provided the Secretary of Transportation with an advisory position regarding DSRC at 5.9 GHz. The advisory letter recommended U.S. DOT to take the following steps:

1. Encourage the efforts of the industry consortia working toward mutually agreeable pre-competitive technical specifications for DSRC at 5.9 GHz.

2. Encourage the efforts of the relevant SDOs, notably the American Society for Testing and Materials (ASTM), the Institute of Electrical and Electronics Engineers (IEEE), and the Society of Automotive Engineers (SAE), to move forward expeditiously with consensus standards, in concert with these consortia and the industry, on a schedule that harmonizes with the FCC rulemaking schedule.

3. Initiate an exploration of future directions, benefits, and costs of deploying DSRC at 5.9 GHz, including specific mechanisms for quantifying, cost-justifying and realizing safety benefits; mechanisms and incentives for encouraging widespread adoption of DSRC devices in private and commercial vehicles; and mechanisms and incentives for encouraging widespread deployment of nationally interoperable public and private infrastructure to interact with equipped vehicles.

ITS America further recommended that U.S. DOT solicit public comment through the Federal Register and that, in conjunction with ITS America, it establish a Blue Ribbon Panel of public and private stakeholders to review the comments and help recommend and encourage ongoing implementation.

Recognizing that wireless communications are an evolving arena in which today's assumptions and recommendations can rapidly be overtaken by events, ITS America recommended that U.S. DOT's process be kept flexible and that it be regularly re-examined, so

that it can adjust responsively to a changing landscape. ITS America added its commitment to U.S. DOT to further define and oversee this process.

The Formal Advice delivered to U.S. DOT on June 5, 2000, evolved significantly since the December 16-17 Workshop and its preliminary statement of results. While there was considerable sentiment at the Workshop to encourage U.S. DOT to explore the costs and benefits of mandating DSRC devices in new vehicles, consensus could not be reached on this issue. Subsequent decisions by the Executive Committee of the Board of Directors supported the commencement of a public dialogue, and placed greater emphasis on closely monitoring the standards development process.

3. ITS America has Provided FCC Updates on Standards and Consensus Activities.

ITS America has been updating the FCC regarding the regular progress of these activities. To date, three meetings have been held between ITS America and the FCC: on March 28, May 9, and June 7, 2000. At each of these meetings, ITS America has informed FCC staff that, as a consensus building organization, it prefers, to the extent possible, to resolve outstanding and contentious issues outside the FCC arena, and to ultimately present to the FCC a complete and unified package. This approach has been the preferred mode of operation for ITS America, which requires continuous dialogue and approval among its public as well as private sector members before any document having significant policy implications can be filed with the FCC.

C. U.S. Department of Transportation

The U.S. DOT continues to support, including through funding, the efforts of ITS America and ASTM in developing a national, interoperable standard for DSRC, as well as a consensus approach toward a national deployment strategy. U.S. DOT has allocated significant

resources toward these objectives, and has contributed funds to acquire the objective, technical support and analyses of Aeronautical Radio, Inc. ("ARINC") and John Hopkins University's Applied Physics Laboratory ("JHU APL").

U.S. DOT further acknowledges ITS America's advisory letter, dated June 5, 2000. U.S. DOT has already taken all the necessary steps to implement the recommendations contained in the Advice letter. U.S. DOT notes that, although the Advice letter deleted the provision encouraging a cost and benefit analysis of mandating DSRC devices in new vehicles, U.S. DOT has requested ITS America to consider a public dialogue on requiring DSRC in all vehicles. On September 18, 2000, ITS America's Board of Director's Executive Committee recommended to begin this public dialogue.

U.S. DOT views the DSRC spectrum as a new communications tool whose principal use is Public Safety applications. U.S. DOT acknowledges the interest of a number of Private Radio applications emerging in the band. While U.S. DOT encourages a competitive environment coupled with flexible licensing rules, U.S. DOT's primary and highest objective requires national interoperability upon the Public Safety applications. There cannot be any compromise on this primary requirement, if this spectrum allocation is to fulfill its intended purpose.

D. DSRC Industry Consortium

As an outgrowth of the 5.9 GHz Stakeholder Workshop, the DSRC Industry Consortium was formed earlier this year. Members of the Consortium are the primary DSRC manufacturers of North America: Amtech Systems (now part of TransCore), Mark IV Industries, Raytheon and Sirit Technologies. The Consortium was formed by the manufacturers themselves to operate in parallel with ASTM and other bodies concerned with an effective technology choice for the new 5.9 GHz band.

The DSRC Industry Consortium has been examining candidate 5.9 GHz technologies from the viewpoint of those who will eventually develop, manufacture and install these systems. Many elements of the eventual technology choice are being considered by this group, among them:

- PERFORMANCE:
  - Will the candidate technology support the full range of ITS applications that require a wireless link?
  - Will the technology meet the established performance requirements of known applications, including vehicle speed, communication range, data rate, access time, and other factors?
  - Does the technology have growth capacity to perform even more effectively in the future, as applications demand higher levels of performance?
  - Will the technology support numerous overlapping applications without becoming overloaded as ITS applications proliferate?

- RISK:
  - Is the candidate technology based on sound physical, technical principles?
  - Is the basic concept proven?
  - Is the technology likely to interact or interfere with other RF sources or devices?
  - Will the technology support the very high accuracy demanded of these systems in safety and fee collection activities?
  - Are manufacturers able to easily produce systems based on the technology?

- COST:
- Will systems based on the candidate technology be overly expensive to develop, manufacture, deploy, maintain, etc?
- Does the technology drive end item pricing (especially for the vehicle-mounted component) to a point of customer resistance?
- Is the technology likely to enjoy cost reductions over time?

The DSRC Industry Consortium has held six meetings to date, most of them two days in duration and most attended by the executive management and technical teams of the member companies. Extremely complex issues have been debated and the group has come to a consensus position on most issues. This position and the knowledge backing it have fed directly into the work of the ASTM Committee debating the technical approaches and the ensuing standards.

The Consortium plans to continue its work throughout the standardization phase to ensure that issues important to manufacturers and integrators are addressed. The Consortium enjoys a

good working relationship with ASTM, U.S. DOT and ITS America, and has received significant support and endorsement. In particular, at the request of the Consortium, U.S. DOT has funded numerous analyses and test activities to ensure that performance and risk areas are fully understood.

II. INDUSTRY CONSENSUS AND DEPLOYMENT STRATEGIES

As discussed in Section I of this Status Report, since the allocation of the DSRC spectrum in October 1999, ITS America and many ITS stakeholders, including public and private sector interests, have been engaged in a continuous dialogue concerning the development of optimal service and licensing rules for the band. These discussions have been held at the highest levels of the ITS industry, and are ongoing. A clear consensus of the ITS industry has emerged from these discussions on several critical issues.

A. DSRC Spectrum Must Be Allocated to Meet Critical Public Safety Needs.

As recognized in the *Report & Order*, many of the DSRC-based ITS applications will serve to enhance traveler and roadway safety. Among other things, DSRC applications in the 5.9 GHz band will be used to enhance the efficiency of use of the transportation infrastructure, improve mobility, reduce traffic congestion, and help realize billions of dollars of gain in economic productivity.

More importantly, however, DSRC applications will be used to meet critical public safety needs. Among these are incident management communications, electronic toll collection, emergency vehicle signal preemption, driver advisory services (in-vehicle signing, voice alerts) and intersection collision warning and avoidance. The DSRC infrastructure will provide a critically needed communications link for the delivery of real-time information and alerts to the